

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.)

2. Claims 1, and 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Inoue et al. (Pub # US 2002/0030481 A1).

Consider claim 1, Inoue et al clearly show and discloses a device (11, Fig. 1) for detecting an abnormality of a rotating body (12, Fig. 1) characterized in that the improvement comprises: means for measuring signal correlated with vibration or sound of the rotating body (rotor which rotates together with the vehicle wheel) in rotation [0048]; means for extracting a signal which is synchronized with the rotation cycle of rotating body by the data measured by the measuring means [0027]; means for determining a condition of the rotating body from the signal extracted by the extracting means; and abnormality warning means for giving warning of abnormality when the determining means determine that the condition of the rotating body is abnormal [0053 lines 1-13]; wherein the extracting means comprise an adaptive digital filter (band-pass filter) which extracts a signal synchronized with the rotation cycle and picks out a signal (resonance frequency) having no correlation with the rotation cycle by means of a data measured by the measuring means and a signal synchronized with the rotation cycle extracted by the extracting means, and adapts the adaptive digital filter (band-pass filter) by means of the

signal (resonance frequency) picked out and having no correlation with the rotation cycle [0049-0051].

Consider claim 11, Inoue et al. clearly show and disclose a method for detecting an abnormality of a rotating body, comprising: measuring signal correlated with vibration or sound of the rotating body (rotor which rotates together with the vehicle wheel) in rotation [0048]; extracting a signal which is synchronized with the rotation cycle of rotating body by the data measured in the measuring step [0027]; determining a condition of the rotating body from the signal extracted in the extracting step; and giving warning of abnormality when it is determined that the condition of the rotating body is abnormal [0053 lines 1-13]; wherein in the extracting step, an adaptive digital filter (band-pass filter) extracts a signal synchronized with the rotation cycle and picks out a signal (resonance frequency) having no correlation with the rotation cycle by means of the data measured in the measuring step and a signal synchronized with the rotation cycle extracted in the extracting step, and the adaptive digital filter (band-pass filter) is adapted by means of the signal (resonance frequency) picked out and having no correlation with the rotation cycle [0049-0051].

Consider claims 12 and 13, Inoue et al. clearly show and disclose the device, wherein the signal extracted by the extracting means has a cycle that is equal to the rotation cycle of the rotating body [0003].

***Claim Rejections - 35 USC § 103***

3. Claims 3-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. as applied to claim 1 above, and further in view of Brusarosco et al. (Pub # US 2007/0010928 A1).

Consider claim 3, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein a delayed data of the data measured by the measuring means is used in extracting a signal synchronized with the rotation cycle in the extracting means.

In the same field of endeavor, Brusarosco et al. teaches the device for detecting an abnormality of a rotating body (tire), wherein a delayed data of the data measured by the measuring means is used in extracting a signal synchronized (performed in real time) with the rotation cycle in the extracting means [0019] for the benefit of improving the data integrity and preventing the false alarm.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include a delayed data of the data measured by the measuring means is used in extracting a signal synchronized with the rotation cycle in the extracting means as shown in Brusarosco et al., in Inoue et al. device for the benefit of improving the data integrity and preventing the false alarm.

Consider claim 4, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein the data delay time corresponds to one rotation time of the rotating body.

In the same field of endeavor, Brusarosco et al. teaches the data delay time corresponds to one rotation time of the rotating body [0008 lines 14-20] for the benefit of improving the data integrity and preventing the false alarm.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include the data delay time corresponds to one rotation time of the rotating body as shown in Brusarosco et al., in Inoue et al. device for the benefit of improving the data integrity and preventing the false alarm.

Consider claim 5, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein a delay circuit to delay the data is provided on a signal line between an input portion of data from the measuring means and an adaptive digital filter.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein a delay circuit to delay the data is provided on a signal line between an input portion of data from the measuring means and an adaptive digital (low-pass) filter [0020] for the benefit of improving data integrity.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include a delay circuit to delay the data is provided on a signal line between an input portion of data from the measuring means and an adaptive digital filter as shown in Brusarosco et al., in Inoue et al. device for the benefit of improving data integrity.

Consider claim 6, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein a delay circuit to delay the data is provided on a signal line between an input portion of data from the measuring means and a comparator to extract a signal having no correlation with the rotation cycle.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein a delay circuit (filtering device) to delay the data is provided on a signal line between an input portion of data from the measuring means (measuring unit) (32, Fig. 3) and a comparator (processing unit) (34, Fig. 3) to extract a signal (noise) having no correlation with the rotation cycle [0079 lines 16-20] for the benefit of determining the tire load from tire deflection.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include a delay circuit to delay the data is provided on a signal line between an input portion of data from the measuring means and a comparator to extract a signal having no correlation with the rotation cycle as shown in Brusarosco et al., in Inoue et al. device for the benefit of determining the tire load from tire deflection.

Consider claim 7, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein an order component generated by calculating a rotating cycle from data of rotating information among the data measured by the measuring means is used in extracting a signal synchronized with the rotation cycle in the extracting means.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein an order component generated by calculating a rotating cycle from data of rotating information among the data measured by the measuring means is used in extracting a signal synchronized with the rotation cycle in the extracting means [0007 lines 6-10] for the benefit of collecting data in various operational condition.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include an order component generated by calculating a rotating cycle

from data of rotating information among the data measured by the measuring means is used in extracting a signal synchronized with the rotation cycle in the extracting means as shown in Brusarosco et al., in Inoue et al. device for the benefit of collecting data in various operational condition.

Consider claim 8, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein an order component generation circuit to generate the order component is provided on a signal line between an input portion of rotation information data from the measuring means and an adaptive digital filter.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein an order component generation circuit to generate the order component is provided on a signal line between an input portion (32, Fig. 3) of rotation information data from the measuring means and an adaptive digital (low-pass) filter [0020] (included in the processing unit) (34, Fig. 3) [0079 lines 1-9] for the benefit of reducing the quantity of information sent out of the tire.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include an order component generation circuit to generate the order component is provided on a signal line between an input portion of rotation information data from the measuring means and an adaptive digital filter as shown in Brusarosco et al., in Inoue et al. device for the benefit of reducing the quantity of information sent out of the tire.

Consider claim 9, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein the data measured by the measuring means is sampled by a variable sampling in accordance with the data of rotating speed information of the data measured by the measuring means so as to make an apparent cycle constant in extracting a signal synchronized with the rotation cycle in the extracting means.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein the data measured by the measuring means is sampled by a variable sampling in accordance with the data of rotating speed information of the data measured by the measuring means so as to make an apparent cycle constant in extracting a signal synchronized with the rotation cycle in the extracting means [0045-0049] for the benefit of providing data input for determining the tire load.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include the data measured by the measuring means is sampled by a variable sampling in accordance with the data of rotating speed information of the data measured by the measuring means so as to make an apparent cycle constant in extracting a signal synchronized with the rotation cycle in the extracting means as shown in Brusarosco et al., in Inoue et al. device for the benefit of providing data input for determining the tire load.

Consider claim 10, Inoue et al. teaches the device for detecting an abnormality of a rotating body.

Inoue et al. does not teach wherein a variable sampling circuit to perform a variable sampling is provided on the input portion of data from the measuring means.

In the same field of endeavor, Brusarosco et al. teaches the device, wherein a variable sampling circuit to perform a variable sampling is provided on the input portion (measuring

device) (32, Fig. 3) of data from the measuring means [0079 lines 7-9] for the benefit of processing signal prior to data calculation.

Therefore, it would have been obvious to a person of ordinary skill in the art at time the invention was made to include a variable sampling circuit to perform a variable sampling is provided on the input portion of data from the measuring means as shown in Brusarosco et al., in Inoue et al. device for the benefit of processing signal prior to data calculation.

#### ***Response to Arguments***

4. Applicant's arguments filed 9/28/2009 have been fully considered but they are not persuasive.

Regarding claims 1 and 11, Applicant argues that Inoue reference does not teach the claimed limitation of "means for measuring a signal correlated with vibration or sound of the rotating body in rotation", and the band-pass filter of Inoue does not correspond to the claimed adaptive digital filter, wherein the band-pass filter does not pick out a signal having no correlation with the rotation cycle and a signal synchronized with the rotation cycle extracted by the extracting means.

The Examiner respectfully disagrees. As described in [0048], Inoue clearly shows and disclose "The **wheel vibration** information detecting routine is performed by the use of the vibration information detecting means of the microcomputer 14b. The wheel vibration information includes tire air pressure information and road surface friction coefficient". As Applicant indicates in the Remarks, "Inoue relates to a method of detecting wheel speed, wheel acceleration, vehicle vibration, and tire air pressure based upon edge information on a rotor 12 that rotates with the vehicle wheel (paragraphs [0010] and [0014])". Since the rotating body was

not specifically limited as "tire, wheel, rim, and etc." in the claim, Therefore, the rotor that rotates with the vehicle wheel is consider as "rotating body" which fulfilled the claim limitation.

Furthermore, according to Wikipedia, "An adaptive filter is a filter that self-adjusts its transfer function according to an optimizing algorithm. Because of the complexity of the optimizing algorithms, most adaptive filters are digital filters that perform digital signal processing and adapt their performance based on the input signal". As described in Fig. 1, the waveform shaping circuit (14a) inputs analog signal and outputs digital signal, where the signal then inputs into the micro-computer (14b), where the band-pass filter and algorithm are resided for performing band-pass filter routing in step 610. Since the adaptive digital filter claimed and band-pass filter cited in Inoue are means for performing same function, which extracts a signal synchronized with the rotating cycle (executed to set the average pulse interval .DELTA.tave achieved at Step 420) and pick out a signal (resonance frequency) having no correlation with the rotation cycle as shown in [0049-0051]. Therefore, the claim limitation is met when the filters are considered as functional equivalent apparatus.

5. Regarding to claims 3-10, Applicant argues that the Brusarosco relates to a method of determining vehicle load of a tire and fails to remedy the deficiencies of Inoue. The Examiner respectfully disagrees. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir.

1992). In this case, Brusarosco teaches the structure of device further describe the data processing collected from vehicle tire. Therefore, the combined teaching of Brusarosco and Inoue are considered in the same field of endeavor and solve the same problem as claimed.

6. Regarding claim 5, Applicant argues that Brusarosco does not teach a delay circuit provided on a signal line between an input portion of data from measuring means and an adaptive digital filter. The Examiner respectfully disagrees. As described in [0018] Brusarosco discloses "Said first signal may comprise a radial acceleration signal. Said step of measuring said amplitude can be performed by measuring a difference between a maximum value of said first signal and a minimum value of said first signal in said first signal portion", this step is a measuring means, wherein [0020] he further disclose " The method may further comprise, **before** said step of measuring said amplitude, a further step of low-pass filtering said first signal". It is well-known in the art that each additional signal processing step will results in delay the data in the circuit, wherein the low-pass filtering step inherently requires low-pass filter to perform the function, and low-pass filter performs same function as adaptive digital filter. Therefore, it is obvious to a person of ordinary skill to combine teaching of Brusarosco in Inoue device to improve data integrity.

7. Regarding claim 6, Applicant argues that Brusarosco does not teach a delay circuit provided on a signal line between an input portion of data from the measuring means and comparator as claimed. The Examiner respectfully disagrees, as described in [0079 lines 16-20], Brusarosco disclose "Furthermore, a filtering device (not shown) may be interposed between the measuring unit 32 and the processing unit 34, in order to low-pass filter the deformation signal and discriminate the useful signal from high-frequency noise caused by the interaction between

the tread band and the road”. Therefore, each additional step performs in the data processing circuit is inherently cause the delay in data signal transmission.

8. Regarding claim 9, Applicant argues that Brusarosco does not teach “the data measured by the measuring means is sampled by a variable sampling in accordance with the data of rotating speed information”. The Examiner respectfully disagrees. As described in [0049], Brusarosco discloses “At least one memory can be associated to said processing unit. Said at least one memory may comprise pre-stored characteristic functions describing an expected radial deformation amplitude versus rotation speed, corresponding to predetermined conditions of tyre load and inflation pressure”. Therefore, the variable sampling has been interpreted as one or more data acquisition within set time period associated with rotation speed.

### *Conclusion*

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACK WANG whose telephone number is (571)272-1938. The examiner can normally be reached on M-F 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Bugg can be reached on 571-272-2998. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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